

## Description of 15299

Lunar sample 15299 is a regolith breccia consisting of a wide variety of glass, mineral, and lithic fragments in a brown glass matrix (fig. 60). It was found part way up the slope of the Apennine front at the Apollo 15 site but it contains considerable mare material. Regolith breccias at the Apollo 15 site have been carefully studied by Simon *et al.* 1986.

**Matrix** - The brown glass matrix is about 30 percent by volume; porosity is about 5 percent. This is best determined with the help of reflected light. Some thin sections show vague evidence of foliation and microfractures are aligned. The bulk sample was friable.

**Glass** - Many glass spheres, fragments of spheres, and devitrified spheres are in the matrix of sample 15299 (fig. 61). Green glass spheres are colorless in thin section. Rare agglutinates are partly digested by the matrix. Note the tiny metallic Fe grains throughout.

**Mineral Clasts** - The grain size distribution is seriate. About half the clasts are individual grains of plagioclase, pyroxene, or olivine. Many have undulatory extinction typical of shock. There is a high percentage of opaque mineral fragments.

**Lithic Clasts** - About 10 percent of the clasts are mare basalt fragments and another 10 percent are plagioclase-rich highland fragments. Many microbreccias as clasts are within sample 15299.

**Petrogenesis** - Lunar sample 15299 has a composition similar to the local soil where it was found and is typical of the regolith breccias found at the Apollo 15 site. The presence of glass spheres and relict agglutinates is good petrographic evidence that the precursor to this sample was a soil. This breccia has a relatively high maturity based on the ferromagnetic resonance maturity index  $Is/FeO$  indicating that it has been formed from a submature lunar soil. The  $Is/FeO$  signal comes from

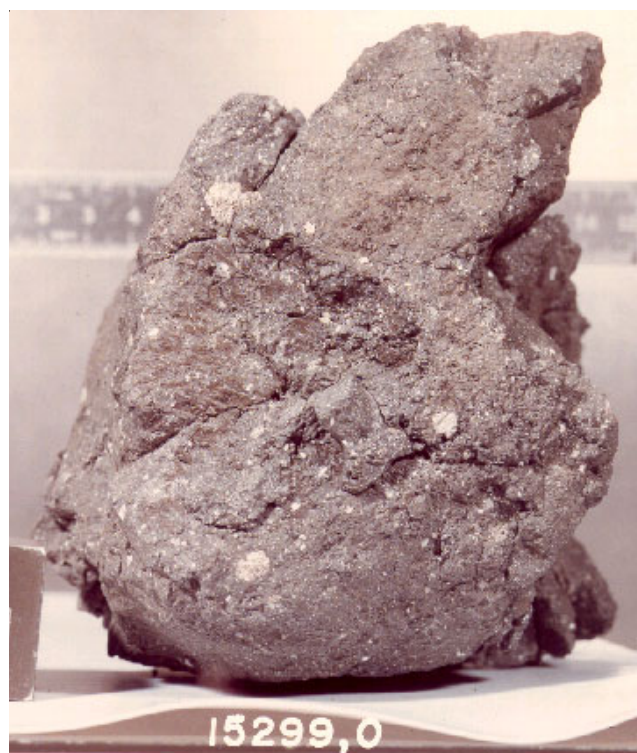


Figure 60 - Brown-glass-matrix breccia 15299 illustrating white clasts of feldspathic material from the highlands. NASA photo no. 74-32566

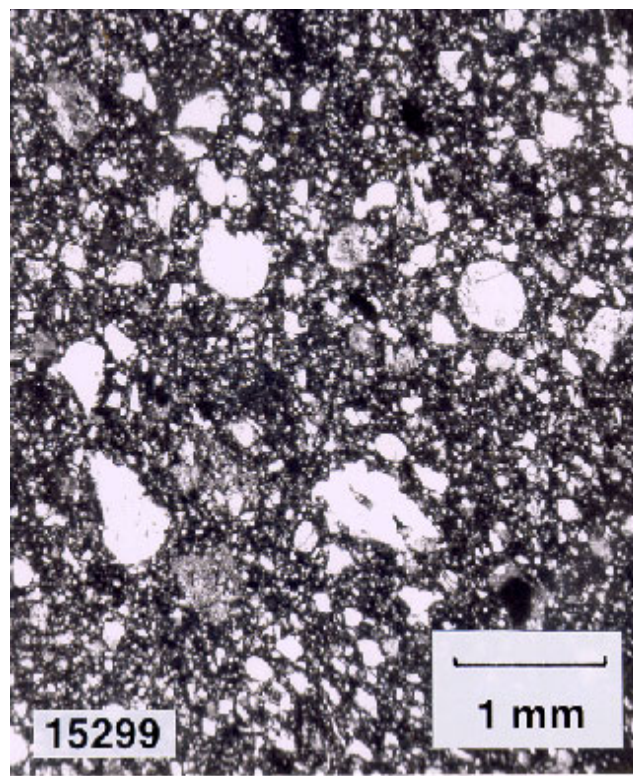


Figure 61 - Matrix of 15299 showing glass spheres which indicate this breccia was made from the local Apollo 15 soil.

the numerous tiny Fe grains that can be seen in reflected light. However, the presence of only a small percentage of recognizable agglutinates is puzzling. Perhaps these were incorporated into the brown glass matrix when the breccia was lithified.

Regolith breccias represent the opportunity to study ancient samples of the lunar regolith. We do not have a good way to date regolith breccias, but the inclusion of green glass spheres and fragments of mare basalts typical of the Apollo 15 site in this breccia proves that it is younger than 3200 million years. It could be as young as the small craters at this site.